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Balli, Faruk; Basher, Syed Abul and Ozer-Balli, Hatice

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Faruk Balli† Syed Abul Basher‡ Hatice Ozer-Balli§

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Abstract

Following the launch of the Euro in 1999, integration among Euro area financial markets increased considerably. As a result, portfolio *home bias* declined across the European financial markets. However, greater market integration has generated a new bias: portfolio *Euro bias*, a situation where Euro investors tend to hold large proportion of assets issued within the Euro region. The first part of this paper presents an empirical analysis of the economic factors at play behind the switch from home bias to Euro bias. We find that decline in default risk and transaction cost are two key determinants of the rise in portfolio Euro bias. The second part of the paper goes deeper into the effects of Euro bias on Euro area bond and equity markets. We observe that both government and corporate bond markets revealed clear signs of strain during the recent financial turmoil. Our results also reveal that the risk-reduction potential from geographic diversification within the Euro equity market is lower than that of the Euro sector diversification.

JEL Classification: F21; F36; G11; G12.

Keywords: Financial integration; home bias; Euro bias; transaction costs.

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†Corresponding author: Department of Economics and Finance, Massey University, Private Bag 11-222, Palmerston North, New Zealand. Phone: +64 6 356 9099 ext. 2330; Fax: +64 6 350 5651. E-mail: F.Balli@massey.ac.nz.

‡Department of Research and Monetary Policy, Qatar Central Bank, P.O. Box 1234, Doha, Qatar. E-mail: bashers@qcb.gov.qa.

§Department of Economics and Finance, Massey University, Private Bag 11-222, Palmerston North, New Zealand. E-mail: H.Ozer-Balli@massey.ac.nz.

1 Introduction

In the 1990s, a financial phenomenon that puzzled economists is why investors hold so much of their wealth in domestic equity rather than investing in an internationally diversified portfolio. Since the benefits of international diversification are well-known,[1] it therefore appeared as puzzling when French and Poterba (1991) observed very high domestic ownership of shares in the world's five largest stock markets: the United State (92.2%), Japan (95.7%), the United Kingdom (92%), Germany (79%) and France (89.4%). Since then, a large number of academic papers have been written explaining the portfolio home bias puzzle – see Lewis (1999) and Karolyi and Stulz (2003) for excellent surveys of the home bias literature.[2]

In recent years, however, portfolio home bias has notably decreased. For instance, measuring portfolio home bias on a 0 to 1 scale, where 1 equals complete home bias and 0 equals no home bias, Sørensen et al. (2007) demonstrated that, from 1993 to 2003, average debt (equity) home bias in 24 OECD countries declined from 0.63 (0.83) to 0.52 (0.67). Particularly in the Euro area, debt home bias declined for all countries; while, with the exception of Greece, equity home bias declined for all Euro countries. Figures 1 and 5 of the present paper, respectively, provide visual evidence of rising foreign debt and equity holdings to GDP ratio for all Euro member countries.

Although portfolio home bias has declined among the Euro countries, a deeper inspection of the geographical patterns of international portfolio holdings reveal that Euro countries have been disproportionately investing in Euro originated assets over the assets originated from non-Euro countries. In other words, Euro investors have shown a strong preference for intra-Euro portfolios than international portfolios. This anomaly has in turn gave rise to a new bias, which now is known as portfolio *Euro bias*.[3] Figures 2 and 6 confirm this assertion. Contributions of Euro debt and equity in Euro members' foreign portfolios have risen quite remarkably over the past years.

Answers to the questions of why the switch from home bias to Euro bias and what economic factors contributed to this switch are related to each other. In the past, foreign portfolio investment was considered risky because seldom investors had required information on foreign

[1] Grubel (1968) first pointed out that international diversification can improve mean-variance trade-off compared to holding a purely domestic portfolio.

[2] Various explanations for the home bias puzzle have been offered in the literature. For a summary of these explanations, see Foad (2008).

[3] Lane (2005) first introduced the concept of portfolio Euro bias. Recently, Giofré (2008) and Balli (2009) provide further evidence for portfolio Euro bias.

portfolios. With the launch of the Euro in 1999, the information problem has been significantly lessened. Besides the information asymmetry, the pace of foreign portfolio investment was often thwarted by numerous other classical factors such as exchange rate risk, interest rate risk or inflation risk. With the introduction of the common currency in 1999, these obstacles became obsolete overnight.[4] The notion of psychological barriers to international diversification that once prevailed among investors had disappeared, and money started to travel across borders more rapidly than ever before (see, among others, Adjaouté et al. (2000) and De Santis (2006)).

One of the purposes for the creation of the Euro zone was the promotion of large and liquid Euro bond and equity markets that could increase the availability of liquid instruments to Euro zone investors. Indeed, the integration in European financial markets has brought a surge in cross-border trading. For example, competition among Euro area governments has led to increasing liquidity of government securities and larger volumes of outstanding issues. Likewise, the Euro area has witnessed an unprecedented boom of corporate bond issuance. Furthermore, the arrival of the Euro had a significant (negative) impact on the underwriting fees of international corporate bonds issued in the new currency.[5] In the equity markets, the total number of initial public offerings (IPOs) and their volume surpassed that of the U.S. and Japan for the first time during 1999-2000,[6] although the trend partly reversed in 2001 and 2002 in the midst of a global decrease both in volume and number of IPOs (Hartman et al., 2003). These developments have led to a reduction in home bias as investors were eager to benefit from the improved diversification and liquidity within the Euro area.

The transition from the decline in portfolio home bias to the rise in portfolio Euro bias has not gone unnoticed in the literature. Adjaouté et al. (2000) provided one of the earliest assessments of the Euro area's securities market. Unsurprisingly, the authors noticed that the disappearance of currency risk in itself had not completely eliminated the existing home bias, but they acknowledged that the range of initiatives taken by European policy makers would foster future intra-Euro investments. Adam et al. (2002) and Baele et al. (2004) conducted very detailed and systematic analysis of the state and evolution of financial integration in the Euro area. In particular, they devised a methodological framework to study the level of financial

[4] Of course, these barriers were mechanical and disappeared immediately with the advent of the single currency. Other obstacles such as transaction costs, credit risk and so forth can slow down the process of cross-border investments in the Euro area. We will get back to this issue later in the paper.

[5] See Santos and Tsatsaronis (2003) for the impact of the Euro on the underwriting market for corporate bonds denominated in the new currency.

[6] At the end of 1999, Euro area stock market capitalization stood at US$ 5,526 billion, the second largest after the U.S. (US$ 16,773 billion) but ahead of Japan (US$ 4,445 billion) – see Kraus (2001) for further information.

integration in five key Euro area markets: money, corporate bond, government bond, credit and equity markets. One of the findings of Baele et al. (2004) is that the bond markets achieved a very high degree of integration, indicating a reduction in the home bias of bond portfolios (both government and corporate bonds) in the Euro area. Similar reduction in equity home bias in the Euro area has also been observed, albeit to a lesser extent. Similar to Sørensen et al. (2007), Foad (2008) observes very sharp drop in intra-Euro equity holdings, with home bias falling from 68% to 29% between the pre -and post-Euro periods. Both Lane and Milesi-Ferretti (2007) and Giofré (2008) document the equity Euro bias phenomenon; for the former, the trade channel seems to drive the equity Euro bias, while the latter finds evidence of the financial channel shaping Euro countries' equity portfolios after integration.

Our objectives in this paper are to empirically analyze the relevant economic factors at play behind the switch from home bias to Euro bias over the periods 1997 and 2001-2007. In so doing, we run bilateral panel regressions comprising 24 OECD countries using a number of variables that are often used in the literature in analyzing the spatial pattern of international portfolio holdings.[7] Next, we examine the implications of rising intra-Euro area investment holdings separately on Euro bond markets and on Euro equity markets. A particular feature of this segment of the analysis is the use of more recent observations (i.e. 1997-2009), which allow us to examine the impact of the recent financial turmoil on the Euro area's financial markets. We wanted to find out in what ways Euro area bond and equity markets have evolved following the transition from home bias to Euro bias.

Our main findings can be summarized as follows. Consistent with the theoretical predictions, the empirical results show that transaction costs, market capitalization and relative credit default risk play decisive roles in the determination of cross-border asset holdings. We find that within the 24 OECD countries, investors reveal a preference for investing in the Euro bond markets, as indicated by the statistically significant coefficient of the Euro area dummy variable. Expectedly, Euro area investors show a tendency of investing in Euro equity markets with lower transaction costs. Consistent with earlier studies, we also observe a remarkable convergence in government bond yields in the Euro area during the 2001-2007 period. However, we have also noticed a partial breakdown of the convergence process following the financial crisis of 2008-

[7] International portfolio flows have skyrocketed in the last fifteen years and a large number of studies have tried to explain their determinants. See De Santis (2006) for a list of related papers. Chan et al. (2005) conducted an empirical analysis on the determinants of domestic bias and foreign bias across different countries from all over the world.

2009. Likewise, the corporate bond markets have also shown clear signs of strain during the recent financial turmoil. Finally, our results also reveal that the risk-reduction potential from geographic diversification within the Euro equity market is lower than that of the Euro sector diversification.

The rest of the paper is organized as follows. Section 2 presents a two-asset portfolio model explaining international bond holdings issued by two different markets. Section 3 describes the data-set, while Section 4 discusses the main empirical findings. Section 5 evaluates the implication of rising Euro bias on Euro bond and equity markets. Section 6 concludes the paper.

2 Foreign Portfolio Model

The basic default risk and transaction cost models of Lewis (1999) and Bernoth et al. (2004) have been modified to the context of international bond markets.[8] Suppose a domestic investor decides to invest his wealth in both domestic and foreign bonds. He will hold foreign bonds as a proportion of his wealth:

$$F_t = \theta \mathrm{A}_t, \tag{1}$$

where F_t and A_t denote the amount of foreign bond holdings and domestic investor's total wealth at time t, respectively; and $\theta \, \epsilon \, [0, 1]$. The remaining wealth is invested in the domestic bonds, D_t:

$$D_t = (1 - \theta)\mathrm{A}_t. \tag{2}$$

Domestic investor maximizes his utility according to the expected return and the variance of the portfolio return:

$$Max \quad U = [E(\mathrm{A}_t + 1), Var(\mathrm{A}_t + 1)]. \tag{3}$$

Because investor's utility increases in response to an increase in expected wealth at $t + 1$ and decreases with respect to the variance of the expected wealth; the first derivative of the utility

[8] Equities do not enter in the foreign portfolio model. A formal model with cross-border investment in equities is beyond the scope of this paper and left for future research.

function, U_1, is assumed to be positive, while the second derivative, U_2, is generally considered to be negative. For simplicity, we assume that relative to the domestic bonds, foreign bonds are subject to lesser or negligible default risk. However, in the empirical analysis we consider the default risk differential between the domestic and foreign countries as a potential determinant of cross-border asset holdings.

Let $P(x_t)$ denote the probability that the return on the domestic debt will be paid in full as expected. Here, x_t includes a set of variables affecting the probability. In the case of a default, the investor receives a fraction of his gross payment, $\tau \epsilon [0, 1 + r)$ where r is the interest rate paid on domestic bonds. Thus, at time t, either the domestic investor is paid in full:

$$P(x) \times (1 + r)(1 - \theta)\mathrm{A}_t, \tag{4}$$

or the investor receives a fraction of the domestic investment:

$$(1 - P(x)) \times \tau(1 - \theta)\mathrm{A}_t. \tag{5}$$

Investor incurs transaction costs proportional to his investment in bonds which in turn negatively affect the liquidity of the bond market. The transaction cost, respectively, for domestic and foreign bond holdings, γ_d and γ_f, is a proportion of outstanding bond value. At $t + 1$, domestic investor's expected wealth is:

$$\begin{aligned} E(\mathrm{A}_{t+1}) = \quad & [P(x_t)(1 + r)(1 - \theta)\mathrm{A}_t + (1 - P(x_t))(1 - \theta)\mathrm{A}_t\tau] \\ & -(1 - \theta)\mathrm{A}_t\gamma_d + \theta(1 + r^*)\mathrm{A}_t - \theta\mathrm{A}_t\gamma_f, \end{aligned} \tag{6}$$

where an asterisk denotes foreign variable. The variance of the investor's wealth is:

$$Var(\mathrm{A}_t + 1) = [P(x_t) \times (1 - P(x_t))(1 - \theta)^2(1 + r - \tau)^2]\mathrm{A}_t^2. \tag{7}$$

Domestic investor maximizes his utility subject to the optimal foreign bond holding. The F.O.C is:

$$\frac{\partial U}{\partial \theta} = \frac{\partial U}{\partial E(\mathrm{A}_{t+1})}\frac{\partial E(\mathrm{A}_{t+1})}{\partial \theta} + \frac{\partial U}{\partial Var(\mathrm{A}_{t+1})}\frac{\partial Var(\mathrm{A}_{t+1})}{\partial \theta} = 0. \tag{8}$$

Domestic investor's optimal share of foreign bond holding is given by:

$$\theta = \frac{[(1 - P(x_t))(1 + r - \tau) + (\gamma_d - \gamma_f) + (r^* - r)]\phi}{P(x_t)(1 - P(x_t))(1 + r - \tau)^2}, \tag{9}$$

where

$$\phi = -\frac{\partial U}{\partial E(\mathrm{A}_{t+1})} \times \frac{\partial Var(\mathrm{A}_{t+1})}{\partial U 2\mathrm{A}_t}.$$

According to Equation (9), the domestic investor is reluctant to hold foreign assets as long as the transaction costs plus the return differential between foreign and domestic bonds outweigh the default risk probability of the domestic bonds, i.e. $[1-P(x)(1+r-\tau)+(\gamma_d-\gamma_f)+(r^*-r)] < 0$. Nonetheless, our model assumes that the domestic investor holds foreign bonds, suggesting that the net return on foreign bonds (cost adjusted) exceeds that of the net return on domestic bonds. As we shall see, the data seems to support this claim. By comparison, domestic investor will be reluctant to hold foreign bonds involving higher issuing costs or lower return, despite their lower default risks.

Equation (9) also states that the optimal share of foreign portfolio is affected by various fundamental factors, such as default risk, transaction costs, return differential, and the level of relative risk aversion of the domestic investor. The effect of default risk on the share of foreign portfolio holdings is given as:

$$\frac{\partial \theta}{\partial \tau} = \frac{(P(x_t) - 1)[(P(x_t)(1 - P(x_t))(1 + r - \tau)^2) + 2G]\phi}{[P(x_t)(1 - P(x_t))(1 + r - \tau)^2]^2} < 0, \tag{10}$$

where

$$G = ((P(x_t)(1 - P(x_t))(1 + r - \tau)^2) \times [(P(x_t) - 1)\tau + (1 - P(x_t))(1 + r) + (\gamma_d - \gamma_f) + (r^* - r)].$$

Thus, a higher default risk in the domestic market will lead domestic investors to hold more foreign bonds. Likewise, the effect of transaction cost on foreign bond holding is determined by:

$$\frac{\partial \theta}{\partial \gamma_f} = \frac{-\phi}{P(x_t)(1 - P(x_t))(1 + r - \tau)^2} < 0. \tag{11}$$

The transaction costs are the cost of intermediation of placing new bonds and are commonly

measured as the sum of management fee, marketing costs, syndicate fees, and selling concessions divided by the issue size. As these costs soar, domestic investor lowers his holding of foreign bonds. By comparison, bond return differential between domestic and foreign bonds may not be a good indicator of θ given the remarkable convergence of bond yields across the Euro area. Consequently, we make use of some bilateral factors such as GDP growth correlation, distance, to capture the return differentials between domestic and foreign bonds.

Finally, the relative risk aversion of the domestic investor may be relevant for cross-border asset holding. We could not directly measure the risk aversion of the domestic investor, but make use of some proxy variables to account for the risk aversion. This includes the ratio of volume of lower graded bonds (junk bonds) to all bonds issued in the domestic country or the volume of junk bonds issued and traded in the domestic market.[9]

2.1 Linking Theory to Empirical Strategy

To empirically analyze the main determinants of the cross-border asset holdings for international portfolio investment, we employed the following reduced form of the above-mentioned two-asset, two-country portfolio model. The reduced form model is given as:

$$\theta_t^{ic} = \alpha^i + \alpha^c + \beta_0^* Debt_t^{i-c} + \beta_1^* TRANS_t^{ic} + \beta_2^* LIQ_t^{ic} + \beta_3^* EMU + \beta_4^* X_t^i + \epsilon_t^i, \tag{12}$$

where the dependent variable θ^{ic} is the share a of foreign country's (c) bond/equity in the total volume of the home country's (i) foreign bond/equity portfolio. Coefficients α^i and α^c correspond to the fixed effects element of the home and foreign country, respectively. Several alternative measures are considered as proxies for the country-specific fixed effects. In particular, for the foreign country's fixed effects, these measures include the factor market capitalization rate, real PPP adjusted GDP per capita and the log linearized population. For brevity, only the statistically significant variables are presented in this paper. $Debt_t^{i-c}$ is the debt-to-GDP ratio differentials between the home and foreign country. It provides an overall measure of the financial leverage of an economy. It also provides information concerning the general government's quality as a borrower, which affects the composition of default risk of the corporate bonds. Since investors are particularly interested in the borrowers' ability to pay back their debts, the inclusion of a measure of fiscal indebtedness is crucial in explaining the pattern of external

[9] Junk bonds are defined as bonds that are rated as CCC or lower by credit rating institutions.

portfolio holdings. $TRANS^c$ is the aggregate primary market transaction costs of bond/equity in the foreign markets.[10] It is constructed by taking weighted averages of the gross spread of each bond/equity issued in each foreign market. LIQ^c is the liquidity, marketability or trading costs of bonds. It is now well established in the literature that transactions costs in the secondary asset markets inhibit the frequency of trading. In general, less liquid bonds are traded less frequently, realize lower prices, and exhibit higher yield spreads. EMU^c is a binary dummy variable equal to 1 if the foreign country is a member of the EMU; zero otherwise. Finally, X_t is a vector of bilateral factors that are often used to capture the informational content of cross-border asset trading. Some bilateral variables include, as often used in the literature,[11] GDP growth correlations and stock market return correlations. Theoretically, allocations that are driven by a diversification motive should be reflected in a negative sign on these correlation variables. Distance among financial markets can impact direct as well as indirect (information related) transaction costs. As a result, we also include distances between capital cities of domestic and foreign markets as a regressor to capture information flows.

3 Data

Our data come from a number of sources. The data comprise information about foreign portfolio investment for 24 high income OECD countries.[12] We obtained pair-wise volumes of cross-border asset holdings in U.S. dollars from the IMF's Coordinated Portfolio Investment Surveys (CPIS) for the years 1997 and 2001–2007. Portfolio investment is broken down between equity and debt, with information on the residence of the issuer and the destination of the investment. The CPIS is the most comprehensive and unique survey of bilateral portfolio investment holdings currently available.

Information on market capitalization of bond markets is taken from Bank for International Settlements (BIS) quarterly review. The size of a country's total bond market capitalization is measured as outstanding domestic debt securities minus outstanding short-term (less than one year remaining to maturity) domestic securities plus outstanding international bonds and notes. Total market capitalization of equity markets is obtained from the World Development

[10] Further discussion on the costs of cross-border investment in the context of Euro area can be found in Adjaouté et al. (2000).

[11] See, for example, Baele et al. (2004) and Lane and Milesi-Ferretti (2007).

[12] These include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Indicator issued by the World Bank. The data for the total debt and government deficit levels of each country are obtained from the IMF's International Financial Statistics (IFS).

Primary transaction costs (gross spread costs) for bonds and equities are taken from the Thompson Deals SDC Platinum database. The gross spreads of bonds are collected from straight/fixed-rate corporate bonds issued by industrial firms. Gross bond and equity spreads of financial or monetary institutions are excluded from the sample to avoid understatement of asset's issuing costs due to their close association with the underwriters. After excluding these observations, our sample comprises 16,124 non-equity linked fixed-rate corporate bonds issued by non-financial corporations. In addition, we exclude 114 observations that did not contain the total value of issued bonds and an additional 13 observations with gross spreads higher than 30%. Likewise, after a similar data cleansing, we have 25,133 observations of equities issued by non-financial firms.

The secondary market transaction cost or liquidity measure is constructed using the method developed by Chen et al. (2007), which extends the Lesmond et al. (1999) methodology to a two-factor model. The two factors (interest rate and equity market return) are included to capture the fact that a corporate bond is a hybrid between a risk-free bond and equity. Essentially, the Chen et al. (2007) liquidity measure involves regressing the desired (or true) bond return for bond j on the two factors. As the desired bond return is unobserved, following Amihud and Mendelson (1986), the desired return and the measured return are linked together after taking liquidity costs (both buy-side and sell-side costs) into account. The effect of liquidity on bond prices is then modeled by combining the main regression equation with the liquidity constraint – see Chen et al. (2007) for further discussion. We obtained daily bond spreads and bond characteristics from Datastream for each corporate bond issued in the Euro region plus Danish, Swedish and UK bond markets.[13] Bonds which are neither rated by S&P500 nor Moody's were also included in the calculations. We separated the corporate bond data-set for bond years in order to calculate the liquidity premia for each year and market. Daily bonds were checked in detail for omission and data errors. For a given bond year, if the return of the bond was zero for more than 70 percent of the whole year observations, then that observation was eliminated for the entire bond year. In addition, we omitted daily prices of the given bond that were ± 50 percent of the prior day's price. Both that day's price and also the prior day's price were eliminated. After the necessary data cleansing, we had reliable information on

[13]Finland and Iceland were excluded from the analysis due to lack of data.

liquidity premiums for 1305 non-callable, non-equity linked corporate bonds issued and traded over 1997–2007.[14]

Daily return of 18 leading sector indices have been constructed from the Dow Jones STOXX dataset.[15] This comprises a total of 300 equities issued among Euro members and spans from 1995 to 2007 to capture the effect of the start of monetary union on equity markets. Other variables that are employed to determine bilateral cross-border asset holdings are distance in kilometers, equity market correlations and GDP growth rate correlations. Distances in kilometers between two countries' capital cities are taken from UK's airport accommodation website.[16] Equity market correlations of different countries are calculated based on the daily stock market price data taken from Datastream and Morgan Stanley Capital International.

4 Estimation Results

Tables 1–6 present pairwise estimates of bilateral portfolio *bond* and *equity* holdings between home and foreign countries. In all cases, the dependent variable is the share of the foreign country's assets (bond or equity) in the home country's total portfolio investment. Let us begin with Table 1 where the OECD represents both the home and the foreign countries. We can see that the host country's share of world market capitalization (FMC^c) stands as a significant factor behind domestic investors' decisions to hold foreign bonds in their portfolios. In general, countries with higher market capitalization tend to have more liquid markets, leading to a common understanding of better earning potential of the investments. Unsurprisingly, transaction costs negatively affect home investors' desire to hold foreign bond assets. When the return differential between home and foreign bonds is narrowing, surely home investors care more about the costs of holding foreign financial assets. The significantly negative estimate of TRANSACTIONCOST^c confirms this point. Interestingly, the coefficient of the dummy variable EMU^c is significantly positive, reflecting OECD investors' bias towards holding Euro originated bonds. This result provides a preliminary support to our research question that the materialization of the European Monetary Union (EMU) has led the member countries to shift from portfolio home bias

[14]Sometimes, there are mismatches between the market where a security is issued and where the security is traded. There are some corporate bonds that are issued, for example, in market A but traded in market B. Datastream filters these bonds; therefore we did not have the problem of identifying corporate bonds with their original markets.

[15]The Euro Zone STOXX covers Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

[16]http://www.airport-accommodation.co.uk/worlddistances.php

to portfolio Euro bias. The coefficient of debt-to-GDP differential (DEBT^{i-c}) is positive and significant at the 5% level under the broader specification, suggesting that a higher domestic debt-to-GDP ratio increases domestic investors' holding of foreign assets. Both distance and output correlation are reported as not statistically significant.

[*Insert Tables 1 and 2 about here*]

Table 2 displays the results for non-EMU home investors holding bonds in the EMU markets. Higher transaction costs (primary and secondary) in EMU financial markets act as a barrier to investment by non-EMU investors.[17] This result is consistent with the stylized consumption-based asset-pricing model which implies that investment in foreign countries can bring diversification benefits but may be discouraged by the transaction costs. Consistent with the theoretical predictions, the coefficients of market capitalization and the debt-to-GDP ratio differential turn out to be positive and significant. Neither distance nor GDP correlation turn out to be individually significant.

Tables 3 and 4 seem to echo earlier findings. In Table 3, where the EMU represents both home and foreign countries, the significantly positive coefficient of DEBT^{i-c} suggests that investors differentiate between government bonds across Euro area countries in terms of liquidity and credit risk. In other words, investors seem to take into account the relative fiscal positions of Euro area governments when pricing bonds issued by these entities. Since fiscal vulnerability differs across member countries, investors from high default risk countries (e.g. Spain) may benefit from diversifying their bond portfolios in low default risk countries (e.g. France). Bond investors are likely to reward those countries that have followed more prudent fiscal policies by offering improved financing conditions (ECB, 2003).[18] This point is further reinforced by the significantly positive coefficient of the Euro bond bias dummy variable (EMU^c) in Table 4, which shows domestic investors' inclination towards EMU originated bonds over international bonds. This result, in agreement with previous findings, suggests that the key factors behind the Euro bond bias are the lower transaction costs and the lower default risk premium. In order to satisfy the Maastricht criteria and the Stability and Growth Pact, the EMU members achieved a sharp decrease in total debt/GDP ratios, leading to a decline in default risk in those markets. In addition, due to the competition among the underwriters and investment banking

[17] Recall that TRANSACTIONCOST^c ($\text{LIQUIDITYPREMIUM}^c$) measures transaction costs associated with primary (secondary) financial markets.

[18] Indeed, the recent sharp widening of the yield of Greece's 10-year sovereign bond relative to Germany is a clear reflection of the sorry state of Greece's public finances.

houses, the gross spreads in the Euro area decreased considerably. Consequently, a domestic investor does not need to seek any other securities, when those in EMU markets are issued and traded cheaper, and contain less default risk.

[*Insert Tables 3 and 4 about here*]

Tables 5 and 6 display estimates of similar regressions, but instead, we concentrate on the pairwise cross-border *equity* holdings. As before, market capitalization and transaction costs remain the significant determinants of cross-border equity holdings. Interestingly, unlike bond investment, the positive and statistically insignificant coefficient of the EMU^c dummy variable shows domestic investors' weak preference for the EMU originated equities over international equities. However, the coefficient of the interaction variable – the EMU dummy multiplied by the transaction costs – is significantly negative, suggesting that when a local Euro investor wants to invest inside the Euro area, they choose assets from markets that have lower issuing costs. This result also supports our previous findings that primary market transaction costs are important in explaining the Euro equity bias. In most cases, the output correlation coefficient is significantly positive, indicating that business cycle synchronization between OECD countries is an equally important determinant of cross-border equity portfolio flows. Finally, Table 6 presents the results for non-EMU home versus OECD host countries. The results are quite different. First and foremost, transaction costs do not appear to be a significant factor for non-EMU investors investing in equities across the OECD area, contrary to what was observed for EMU investors (see Table 5). This difference in result is possibly due to differences in investors' motives for holding equity assets. In the case of non-EMU investors investing in OECD equities, the investments appear to be motivated by diversification objectives, as evident by the negative coefficient of GDPCORRELATION, whereas it is driven by non-diversification gains for the EMU investors, as the coefficient of GDPCORRELATION is significantly positive. Expectedly, the coefficient of the interaction effect between the EMU dummy and transaction costs is negative, suggesting that non-EMU investors tend to hold lower equity assets from EMU markets where the primary cost of equity investment is higher. However, this effect is not statistically significant. Quite surprisingly, non-EMU investors show a negative bias towards EMU-based equities, as indicated by the significantly negative coefficient of EMU^c. The incidence of "negative EMU bias" is quite puzzling and we leave this issue for future research.

[*Insert Tables 5 and 6 about here*]

In summary, consistent with the theoretical predictions, the results show that transaction costs, market capitalization and relative fiscal indebtness play important roles in the determination of cross-border asset holdings. In contrast, bilateral variables do not appear to significantly explain the design of an optimal portfolio.

5 Financial Integration and the Rise in Euro Bias

This section is divided into two parts. In the first part, we examine the implications of increased financial integration on the Euro area bond (government and corporate) markets. The second part focuses on the impact of financial integration on the Euro area's equity markets.

5.1 The Rise of Euro Bond Bias

With the introduction of the Euro, there has been a considerable change in Euro area bond (government and corporate) markets. As Figure 1 shows, the ratio of foreign debt holdings to GDP in each Euro country rose significantly over the last few years. This, in turn, has resulted in an increase in volume of bond trading with each other, which is evident from the increase in the Euro share of Euro members' foreign debt holdings (see Figure 2). This is likely to indicate that the reduction in the home bias in bond portfolios was largely restricted to the Euro area only, suggesting that bond market integration has increased to a much greater extent between the various Euro area markets than between world bond markets.[19]

Increasing financial integration has had a dramatic impact on the Euro area government bond markets, which is the main source of financing for central and local governments within the area. For example, yields spread between 10-year government bonds, relative to Germany,[20] across most Euro area countries declined sharply. Adjaouté and Danthine (2003) attribute this strong convergence of government bond yields to a similarly strong convergence in underlying fundamentals such as elimination of exchange rate risk, convergence in economic policies including monetary polices and the restrictions on fiscal policies as outlined in the Stability and Growth Pact. In addition to the strong compression in yield spreads, dispersion in yield for 10-year government bonds relative to Germany has also declined. For instance, Adjaouté and

[19]This is consistent with the finding of Baele et al. (2004) who observed that from 1998 to 2003, the share of non-Europe bond funds remained more or less constant at around 20 percent, while the share of Europe-wide bond funds saw a more than three-fold increase (from less than 20 percent to over 60 percent).

[20]In the absence of yield in a perfectly integrated market, the 10-year German government bond yields are considered as a second-best alternative in the literature.

Danthine (2003) noticed a more than 90 percent fall in the cross-sectional dispersion of yields from pre-Euro period to the post-Euro period.

To get an understanding of the impact of financial integration on bond yield spreads across the Euro area countries, following Baele et al. (2004), we estimate the following regression:

$$\Delta \text{RF}_{it} = \alpha_{it} + \beta_{it} \times \Delta \text{RF}_{ger,t} + \varepsilon_{it}, \tag{13}$$

where RF_{it} represents the yield on a 10-year government bond in country i at time t, while RF_{ger} is the yield on a 10-year German benchmark bond, α_{it} is the time-varying intercept, β_{it} is the time-varying slope coefficient with respect to yield changes in the German benchmark bond, Δ is the difference operator, and ε_{it} is the country-specific shock. The coefficient β is a direct measure of the speed of convergence in the overall market.[21] Thus, when β converges to unity, markets appear to be more integrated. With a complete or high degree of integration, bond yields should react only to news common to all markets, since purely local risk factors are assumed to diversified away by investing in bonds in different regions (Baele et al., 2004). The same process works in reverse when β approaches zero.

Equation (13) is estimated using bond yields over the 1997-2009 period. Figure 3 reports the evolution of the estimated beta coefficients over time. As can be seen, the betas varied across countries until 1999, after which they converged considerably.[22] Greece was an exception due to its later integration into the monetary union; however, once Greece joined the Euro in 2001, its beta quickly reached the a close to one. Approximately, over the 2001-2007 period, the evidence from Figure 3 suggests that local bond yields were increasingly driven by common news, and considerably less affected by idiosyncratic local news. One critical aspect of the Euro sovereign bond yields convergence was that Germany's interest rate did not rise to meet the rates of the member countries halfway; rather, interest rates of the member countries converged toward the rates of Germany.[23] This resulting underpricing of sovereign default risk during the recent credit boom gave several Euro member countries easy access to longer-term borrowing. Thus, despite their high debt-to-GDP ratios, the PIIGS[24] countries were able to borrow at a (lower) cost similar to countries with comparatively better fiscal positions (e.g. Germany). Particularly

[21] The is the so-called *beta convergence* widely used in economic growth literature. See Adam et al. (2002) for further discussion.

[22] Increase in both the supply of liquidity and the risk appetite by international investors during the post-Euro period can be attributed to the remarkable convergence of EMU government bond spreads after 2001.

[23] We are grateful to Stephen L. Jen for bringing this point to our attention.

[24] PIIGS: Portugal, Ireland, Italy, Greece and Spain.

among the PIIGS countries, Greece's situation is quite unique.[25] Greece has a long history of fiscal trouble. Greece, as noted by Reinhart and Rogoff (2008), spent more than half the years since 1800 in default. Although some degree of budgetary discipline and debt stabilization was achieved in the run-up to Euro membership, once safely inside the Euro, Greece relaxed its fiscal grip. Even months after the collapse of Lehman Brothers (shielded by Euro membership), Greece was able to borrow easily, if not as cheaply as before the financial crisis.[26] Nonetheless, years of spending splurge, accumulation of the debt mountain and the problem of misreporting of statistics by the Greek authorities eventually led Greece into the sovereign-debt crunch.

Naturally, these local developments have weakened the convergence process of Euro area sovereign spreads vis-à-vis the German benchmark in the most recent years. As evident from Figure 3, the estimates of beta coefficients have drifted away from unity – particularly for the PIIGS countries – during the economic and financial crisis of 2008-2009. Not surprisingly, the extent of divergence has been largest for Greece compared to other PIIGS countries, which is clearly consistent with Greece's recent debt crisis. These results clearly signal how the evolution of local risk factors may create problems in the (full) integration of the government bond market. Our results are in line with the ECB (2009), which also observes the recent tendencies towards market segmentation for government bond market based on both price-based and quantity-based indicators.[27]

[*Insert Figures 1, 2 and 3 about here*]

Compared with the government bond market, the European corporate bond market is relatively young and considerably smaller than those of the United States and Japan. Nevertheless, as reported by Baele et al. (2004), since 1998, the volume and value of corporate bonds (both A-rated and BBB-rated segments) increased substantially. For example, from 1998 to 2003, the value of the A-rated segment bond increased from €30 billion to €220 billion, whereas the value of the BBB-rated segment increased from €3 to more than €182 during the same period. Much of the increase in lower-rated bonds was due to the increased participation of non-financial corporations. From the demand side, the combination of an ageing population,

[25] Despite the similarities in fiscal vulnerabilities among PIIGS countries, no other country shares them all to the same degree as Greece (Portugal comes closest). As noted by Rossi and Aguilera (2010), foreign claims on Greece amount to $302.6 billion, of which $106.8 billion is claimed on the public sector. At 31.6% of GDP, this is over twice as large as the average of the other PIIGS (15.1%).

[26] "Greece's sovereign-debt crunch: A very European crisis", *The Economist*, February 4, 2010.

[27] See Balli (2009) for further discussion on the state of financial market integration across Euro area government bond markets.

large unfunded pension liabilities and the reduction in government bond yields, as well as the decline in the level of government bond debt, led investors to turn to long-term fixed income corporate bonds (Baele et al., 2004). Figure 4 plots return differences between different rated corporate bonds relative to a benchmark government bond yield. Not surprisingly, the yield difference is higher for A− rated bond vis-à-vis the AAA rated bonds. This is because higher rated bonds have a lower credit spread compared with the lower rated bonds.

[*Insert Figure 4 about here*]

As before, we can measure the extent of corporate bond market integration by utilizing a similar empirical analysis where yield spread on a corporate bond is regressed on a benchmark government yield to capture the component that is common to all corporate bonds. The regression is specified as:

$$\Delta \mathrm{R}_{it} = \alpha_{it} + \beta_{it} \Delta \mathrm{R}_{\mathrm{f}t} + \beta_s \mathrm{MFI} + \varepsilon_{it}, \tag{14}$$

where $\Delta \mathrm{R}_{it}$ is the daily percentage change in yield of each corporate bond and $\Delta \mathrm{R}_{\mathrm{f}t}$ is the daily percentage change in the Euro-wide 10-year government bond yield, which is measured by taking the weighted average of the government bond yields in the region. The dummy variable MFI is included to isolate corporate bonds issued by financial or monetary corporations, which are expected to comove strongly with the government bonds. Corporate bonds are categorized according to their credit ratings and regressions are done for each category.[28]

[*Insert Table 7 about here*]

Similar to government bond yields, Equation (14) is estimated using bond yields over the 1997-2009 period. Table 7 provides the estimates of betas for the entire Euro corporate bond market. The result indicates that changes in the higher-rated bond yields (such as AAA) are significantly explained (and at a greater magnitude) by the variations in the Euro wide long-term government bond yields relative to A− rated corporate bonds. As the default risk on corporate bond decreases (i.e. the credit ratings of the bonds increases), beta coefficients move closer to 1. Furthermore, beta coefficients gradually move toward 1 as time passes, particularly over the 1997-2006 period. The gradual convergence states that higher credit rated bonds do not reflect

[28] We do not consider bonds below A rating, as their number were limited at the beginning of the monetary union.

the idiosyncratic properties of the bonds or the market they issued, since they are converging to government bond returns regardless of the wide range of fiscally vulnerable markets. However, similar to the government bond markets, the corporate bond markets have also shown clear signs of strain during the recent financial turmoil. This is indicated by the reduction of beta coefficients (or lack of convergence) over the 2007-2009 period for all segments of corporate bonds. The positive and significant estimates of the dummy variable across three categories of corporate bonds emphasize the point that bonds issued by private financial or monetary corporations strongly comove with their government counterparts. This strong comovement of yields between corporate and government bonds suggests that the return risks of the corporate bond are mostly hedged with the government bond returns.

5.2 The Rise of Euro Equity Bias

Similar to the Euro government and corporate bond markets, Euro area equity markets have recorded considerable growth over the past decade. Figures 5-6 (analogous to Figures 1-2) provide evidence of the rise in Euro equity bias over the 1997-2007 period. Compared to the foreign debt holding to GDP ratio, the share of foreign equity to GDP ratio has been modest – see Figure 5. Interestingly, similar to the case with debt assets, Belgium, Ireland and the Netherlands appear to be more aggressive than other Euro members in holding foreign equity assets as a percentage of their GDP. Figure 6 shows that much of the cross-border equity investments happened within the member countries, reflecting Euro investors' preference of holding Euro originated equities over equities originated from other OECD or emerging markets.

[*Insert Figures 5 and 6 about here*]

The degree of equity market integration can be analyzed from several angles. One segment of the literature analyzes whether portfolios should be allocated across countries or across industries.[29] While several earlier papers[30] did not find empirical support in favor of industry factors, more recent papers have found that industry effects are becoming more important. For example, both Baca et al. (2000) and Cavaglia et al. (2000) show that industry-specific factors have become more important than country effects in explaining international return variation toward the late 1990s. However, Brooks and Del Negro (2004) show that part of the increase in the dominance of industry over country effects may be due to the technology bubble of the

[29] See Baele et al. (2004) for a brief review of the related literature.

[30] See, for example, Heston and Rouwenhorst (1994, 1995) and Griffin and Karolyi (1998).

late 1990s. Notwithstanding, Brooks and Del Negro (2004) observe greater integration across European stock markets after 1998 as a consequence of the start of EMU and the increasing harmonization of government policies in Western Europe. In particular, for the European sample excluding the TMBT sectors,[31] Brooks and Del Negro (2004) find that industry effects have become significantly more important than country effects. This finding is in contrast to the traditional top-down approach of portfolio investments, whereby portfolio managers first select the countries in which to invest and then choose the best securities in each market.[32]

[*Insert Figure 7 about here*]

To analyze the degree of equity market integration in the Euro area markets, we have followed the literature and computed the cross-country and cross-sector correlations over time.[33] The correlations are calculated as:

$$\sum_{i=1}^{m}\sum_{j=1}^{m}\frac{(\eta_{ij}\omega_{ij})}{2}, \quad i \neq j \tag{15}$$

where η_{ij} is the correlation between two sectoral indices i and j, and ω_{ij} is the weight of the two indices in the total value of the equities outstanding in Euro region. Figure 7 presents the weighted average of time-varying correlations of pairwise national indices and sector indices within the Euro area over the 1996-2009 period. As can be seen, with the exception of 2004, both the national and sectoral index correlations increased over the 2001-2009 period. One possible explanation for the rise in cross-correlations during the post-Euro period could be due to the decline in home bias in the portfolio holdings of investors. As a result, for example, the marginal investor in German equities may no longer be German, so that country-specific investor sentiment now plays a smaller role in national equity markets (Brooks and Del Negro, 2004). Another likely explanation is that firms may have become more diversified across countries in their sales and financing. Thus, companies around the Euro area may have been more exposed to the Euro business cycle, causing national stock markets to move together more (Brooks and Del Negro, 2004). In other words, the increase in correlations during 2001-2009 period (barring 2004)

[31] The TMBT sectors include telecommunications, media, biotechnology, and information technology.

[32] Adjaouté and Danthine (2003) also find that the potential of diversifying across sectors increased considerably at the end of the 1990s.

[33] The Euro sector index comprises 18 important sectoral indices developed by Dow Jones STOXX. The Euro 600 STOXX sector index contains 12 Euro members and the global 600 index includes 15 EU countries and higher income OECD members. The countries included in the global index are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States.

may have been caused by the cycle rather than structural changes in the underlying economy and/or financial system.[34] Notably, the European equity markets show no sizeable reduction in their degree of integration since the financial turmoil unfolded in the second half of 2007. Interestingly, over nearly the entire sample, country correlations have been higher than sector correlations, implying that the risk-reduction potential from geographic diversification within the EMU is lower than that of sector diversification. This result is consistent with that of the ECB (2009),[35] which found that since 2001, the benefits of diversification through sector-based equity investment strategies has increased relative to those obtained through country-based ones.[36]

6 Conclusions

The main objective of this paper is to empirically analyze the transition from the reduction in home bias to the rise in Euro bias as a consequence of the introduction of Euro in 1999. With this objective in mind, we analyze factors at play behind the switch from home bias to Euro bias. All in all, we argue that the rise in Euro bias is, to a large extent, explained by a similarly strong convergence in underlying fundamentals such as the elimination of exchange rate risk, convergence in economic policies (particularly monetary policies) and the restrictions on fiscal policies as outlined in the Stability and Growth Pact.

Based on our main empirical analysis, we find that (lower) transaction cost is the leading factor for the attractiveness of bond investment in the Euro area. The substantial decline in bond underwriting costs as well as the reduction in sovereign debt positions of the federal governments led local investors to diversify their debt portfolio mainly within the Euro markets. The results are almost similar for the Euro area equity markets. We also analyze the degree of

[34]The industrially specialized EMU members have potential to experience asymmetric national output shocks even though the recent literature has foreseen capital market integration and Euro bias as a reason for synchronization of Euro area markets with the United States. Anderton et al. (2004) argue that global economic integration and international linkages have actually resulted in a greater degree of synchronization of international activities at a global level between the Euro area and the United States.

[35]See ECB (2009) for the impact of the financial turmoil on the degree of financial integration in the Euro area.

[36]Kalemli-Ozcan et al. (2003) show that greater economic integration among the high income OECD countries, in particular the Euro countries, resulted in higher specialization in production through better cross-country income insurance. As a result, the Euro area financial market has become more independent, although the effect of specialization has been more pronounced in the equity markets relative to corporate bond markets. This is primarily due to the concentration of Euro corporate bonds in a limited number of sectors. In addition, higher specialization in production has led to "strong" production sectors in the entire Euro area, with firms located in different countries exhibiting similar output fluctuations. Therefore, the sectors are seen to have formed clusters. These clusters are dubbed "super-sectors" by Kraus (2001), who argued that the sectoral indices are the leading force for stock market returns.

market integration in the three key Euro area markets: government bond, corporate bond and equity markets. Consistent with earlier studies, we also observe a remarkable convergence in government bond yields in the Euro area during the 2001-2007 period. However, we have also noticed a partial breakdown of the convergence process following the financial crisis of 2008-2009. Likewise, the corporate bond markets have also shown clear signs of strain during the recent financial turmoil. Finally, our results also reveal that the risk-reduction potential from geographic diversification within the Euro equity market is lower than that of the Euro sector diversification.

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Table 1: Determinants of bilateral portfolio bond holdings: OECD source countries

	Home: OECD Foreign: OECD	Home: OECD Foreign: OECD	Home: OECD Foreign: OECD
FMC^c	0.28***	0.28***	0.31**
	(2.75)	(2.91)	(2.43)
DEBT^{i-c}	0.33**		0.56**
	(2.17)		(2.09)
TRANSACTIONCOST^c		−2.18**	−2.17**
		(−2.13)	(−2.48)
EMU^c	1.05***	2.14***	3.13***
	(4.56)	(3.12)	(3.48)
DISTANCE	−0.46	−0.34	−0.62
	(−1.01)	(−0.81)	(−0.64)
GDPCORRELATION	0.72	0.48	0.84
	(1.54)	(1.52)	(1.60)
SAMPLE	462	462	462
ADJUSTED R SQUARE	0.30	0.38	0.41

Notes: Panel regressions are done for country by country bond holdings. Home refers to the classification of the domestic country. Foreign refers to the classification of the country issuing the foreign asset. For example, when we have "Home: EMU, Foreign: non-EMU" this limits the sample to country pairs in which the home country is an EMU member while the foreign country is taken from the sample of non-EMU. Annual data is used for years 1997, 2001–2007. OECD includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Iceland, Japan, Korea Republic, Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, Switzerland, UK, and US. The dependent variable is the share of foreign country (c)'s bond in the total volume of home country (i)'s foreign bond portfolios. FMC^c is defined as the foreign country's share of world market capitalization. DEBT^{i-c} is the total debt to GDP ratio differentials between home and foreign country. TRANSACTIONCOST^c are the expenses in the process of issuing the corporate bonds in the foreign country. The details of this variable is given in the text. DISTANCE is logarithm of the distance in miles between the capital cities of home and foreign country. EMU^c is a dummy variable equal to 1 if foreign country is a member of EMU, zero elsewhere. Heteroscedasticity consistent t-statistics are given in parenthesis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 2: Determinants of bilateral portfolio bond holdings: Non-EMU OECD source countries

	Home: non-EMU Foreign: EMU	Home: non-EMU Foreign: EMU	Home: non-EMU Foreign: EMU	Home: non-EMU Foreign: EMU
FMC^c	0.24**	0.24**	0.25***	0.21***
	(2.11)	(2.20)	(2.15)	(2.42)
DEBT^{i-c}	0.41**	0.41***		0.48**
	(2.17)	(2.75)		(2.04)
TRANSACTIONCOST^c			−1.11***	−1.16**
			(−2.48)	(−2.08)
LIQUIDITYPREMIUM^c		−1.51**	−1.60**	−1.31**
		(−2.09)	(−2.41)	(−2.47)
DISTANCE	−0.06	−0.09	−0.11	−0.09
	(−0.61)	(−0.91)	(−1.20)	(−1.61)
GDPCORRELATION	0.41	0.44	0.72	0.28
	(1.17)	(1.11)	(1.30)	(1.65)
SAMPLE	273	273	273	273
ADJUSTED R SQUARE	0.46	0.48	0.45	0.45

Notes: See Table 1. LIQUIDITYPREMIUM^c is the liquidity premium of each bond market which is constructed by taking weighted averages of corporate bonds liquidity premia. Heteroscedasticity consistent t-statistics are given in parenthesis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 3: Determinants of bilateral portfolio bond holdings: EMU source countries

	H: EMU F: EMU	H: EMU F: EMU	H: EMU F: EMU	H: EMU F: EMU	H: EMU F: EMU
FMC^{c}	0.28***	0.26***	0.28***	0.31***	0.34***
	(6.43)	(5.44)	(5.11)	(4.13)	(3.05)
DEBT^{i-c}			2.45***	3.12***	3.5***
			(5.21)	(3.21)	(4.15)
TRANSACTIONCOST^{c}	−1.16**		−0.89**		−0.98***
	(−2.18)		(−2.28)		(−2.62)
LIQUIDITYPREMIUM^{c}		−0.29***		−0.56***	−0.51***
		(−3.44)		(−3.18)	(−4.12)
DISTANCE	0.04	0.13	0.19	0.12	0.41
	(1.03)	(0.89)	(0.78)	(1.24)	(1.32)
GDPCORRELATION	−0.46	−0.31	−0.26	−0.42	−0.54
	(−1.63)	(−1.62)	(−1.51)	(−1.26)	(−1.61)
SAMPLE	110	110	110	110	110
ADJUSTED R SQUARE	0.43	0.43	0.46	0.46	0.48

Notes: See Tables 1 and 2. Heteroscedasticity consistent t-statistics are given in parenthesis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4: Determinants of bilateral portfolio bond holdings: EMU source countries

	Home: EMU Foreign: OECD	Home: EMU Foreign: OECD	Home: EMU Foreign: OECD	Home: EMU Foreign: OECD
FMC^c	0.26***	0.29***	0.28***	0.35***
	(4.12)	(4.44)	(4.08)	(3.13)
DEBT^{i-c}	0.26***		0.28***	0.29***
	(2..78)		(2.88)	(3.12)
TRANSACTIONCOST^c		−0.38***	−0.38***	−0.35***
		(−2.90)	(−2.78)	(−3.09)
EMU^c	1.33***	1.31		0.81*
	(3.11)	(1.53)		(1.70)
DISTANCE	0.11	0.21	0.24	−0.14
	(0.45)	(0.56)	(0.42)	(−0.14)
GDPCORRELATION	0.55	0.22	0.34	0.52
	(0.43)	(1.54)	(1.11)	(0.43)
SAMPLE	231	231	231	231
ADJUSTED R SQUARE	0.39	0.39	0.41	0.43

Notes: See Tables 1 and 2. Heteroscedasticity consistent t-statistics are given in parenthesis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5: Determinants of bilateral portfolio equity holdings: EMU source countries

	H: EMU F: OECD	H: EMU F: OECD	H: EMU F: OECD	H: EMU F: OECD
FMC^c	0.27**	0.26***	0.25***	0.30***
	(12.23)	(12.14)	(8.45)	(8.14)
TRANSACTIONCOST^c	−0.57**		−0.59**	−0.62
	(−2.05)		(−2.16)	(1.38)
EMU^c	−0.12	0.17		1.22
	(−1.13)	(1.34)		(1.54)
EMU^c × TRANSACTIONCOST^c			−0.35**	−0.62**
			(−2.12)	(−2.30)
DISTANCE	0.41	0.13	−0.15	−0.21
	(0.25)	(0.46)	(−0.51)	(−1.34)
GDPCORRELATION	0.23**	0.54	0.62**	0.14**
	(2.15)	(1.31)	(2.42)	(2.41)
SAMPLE	198	198	198	198
ADJUSTED R SQUARE	0.40	0.40	0.42	0.44

Notes: See Table 1. Heteroscedasticity consistent t-statistics are given in parenthesis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6: Determinants of bilateral portfolio equity holdings: Non-EMU OECD source countries

	H: non-EMU F: OECD	H: non-EMU F: OECD	H: non-EMU F: OECD	H: non-EMU F: OECD
FMC^c	0.41***	0.45***	0.42***	0.46***
	(10.14)	(10.12)	(6.33)	(9.21)
TRANSACTIONCOST^c	−0.22		−0.28	−0.26
	(−0.43)		(−1.31)	(−1.46)
EMU^c		−2.13**	−1.65**	−1.67**
		(−2.16)	(−2.07)	(−2.01)
EMU^c × TRANSACTIONCOST^c				−0.56
				(−1.15)
DISTANCE	0.53	0.22	−0.18*	0.46
	(1.33)	(0.95)	(1.85)	(0.54)
GDPCORRELATION	−0.31	−0.16	−0.42	−0.20
	(−0.54)	(−0.33)	(−0.74)	(−0.31)
SAMPLE	228	228	228	228
ADJUSTED R SQUARE	0.48	0.48	0.48	0.49

Notes: See Table 1. Heteroscedasticity consistent t-statistics are given in parenthesis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7: Corporate bond return correlations with government bond returns

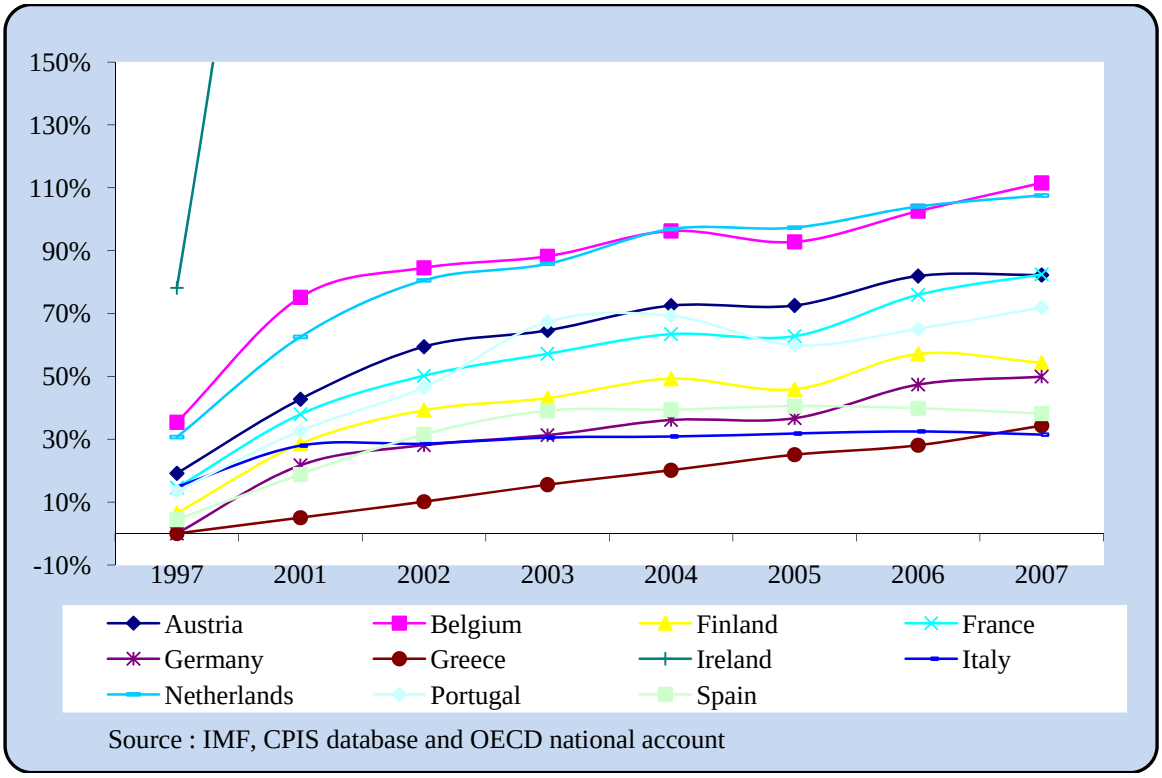
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
'AAA' rated bonds													
β_f	0.44***	0.47***	0.51***	0.53***	0.60***	0.64***	0.65***	0.69***	0.65***	0.70***	0.62***	0.58***	0.50***
	(5.86)	(17.40)	(6.29)	(12.32)	(7.50)	(12.80)	(30.95)	(8.85)	(12.13)	(11.43)	(10.21)	(10.04)	(8.84)
MFI	0.25***	0.35***	0.06***	0.11***	0.21***	0.071*	0.13***	0.14***	0.15***	0.15***	0.16***	0.14***	0.12***
	(6.25)	(11.66)	(12.00)	(3.66)	(10.50)	(1.77)	(6.50)	(3.50)	(3.21)	(3.77)	(2.88)	(3.13)	(3.01)
R SQUARE	0.46	0.46	0.51	0.53	0.61	0.61	0.63	0.65	0.63	0.67	0.68	0.65	0.65
'AA' rated bonds													
β_f	0.39***	0.47***	0.51***	0.54***	0.58***	0.54***	0.55***	0.64***	0.64***	0.66***	0.55***	0.51***	0.43***
	(5.20)	(17.40)	(6.29)	(12.55)	(7.25)	(10.80)	(26.19)	(4.92)	(6.12)	(5.32)	(5.71)	(2.77)	(3.12)
MFI	0.22***	0.24***	0.12**	0.16***	0.11**	0.11***	0.09***	0.15***	0.13**	0.14**	0.14***	0.10**	0.09**
	(4.40)	(4.80)	(2.40)	(4.00)	(2.20)	(2.75)	(3.00)	(5.00)	(2.43)	(2.51)	(2.78)	(2.12)	(2.45)
R SQUARE	0.43	0.47	0.51	0.50	0.49	0.45	0.46	0.45	0.46	0.46	0.48	0.48	0.46
'A' rated bonds													
β_f	0.31***	0.31***	0.38***	0.44***	0.52***	0.51***	0.54***	0.58***	0.55***	0.51***	0.51***	0.45***	0.39***
	(4.62)	(8.15)	(5.27)	(7.85)	(5.71)	(7.61)	(7.39)	(6.37)	(4.45)	(5.34)	(7.17)	(5.34)	(7.17)
MFI	0.16***	0.19***	0.16***	0.21***	0.15**	0.21***	0.19**	0.24**	032***	0.34**	0.30**	0.27***	0.25***
	(2.66)	(3.80)	(8.00)	(5.25)	(2.50)	(3.50)	(2.11)	(2.40)	(2.68)	(2.56)	(2.33)	(3.13)	(3.12)
R SQUARE	0.47	0.41	0.44	0.46	0.47	0.42	0.46	0.46	0.47	0.47	0.45	0.48	0.51

Notes: This table illustrates the effect of the daily government bond return changes on the corporate bond returns for entire Euro region. The panel model is defined as,

$$\Delta \log \mathrm{R}_{it} = \beta_{fc} \times \Delta \log \mathrm{R}_{gt} + \beta_s \times MFI + \varepsilon_{it}.$$

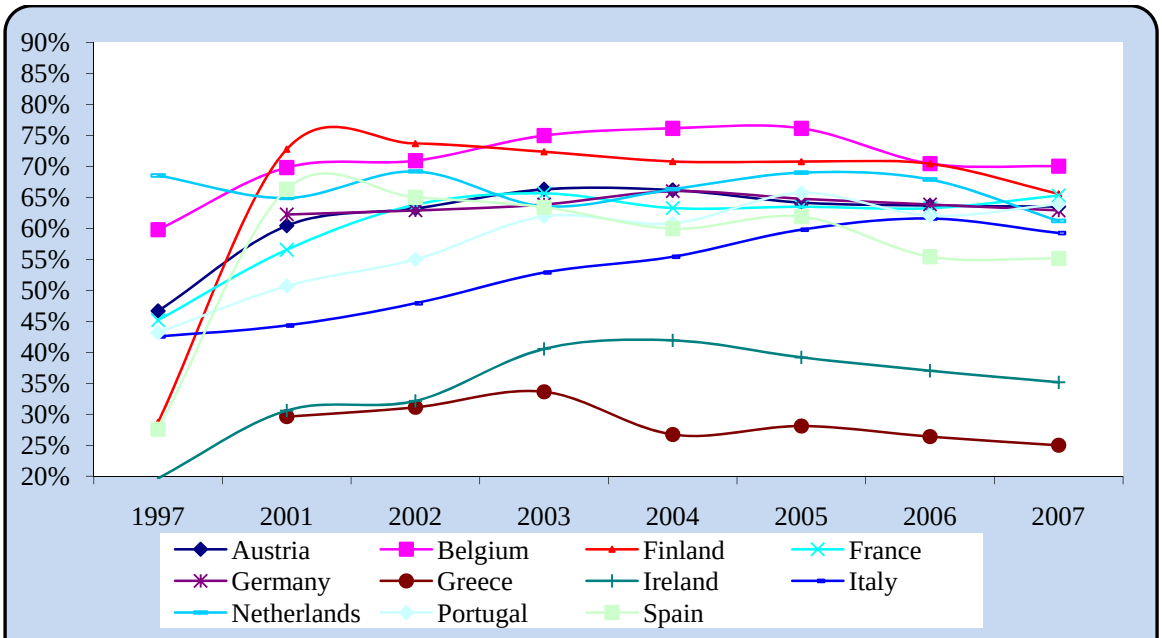
Standard errors are given in brackets. $\Delta \log \mathrm{R}_{it}$ is the daily change in the corporate bond yield issued in Euro area, whereas $\Delta \log \mathrm{R}_{gt}$ is the daily government bond yields change in Euro area. This variable is created by taking weighted averages of each benchmark government bond yields. MFI is a dummy variable which takes 1 when the firm issued the corporate bond is a financial or monetary institution, zero elsewhere. AAA, AA, A are the credit ratings of the bonds. Following Merrill Lynch, we use a composite measure of Moody's and Standard & Poors ratings. Heteroscedasticity consistent t-statistics are given in parenthesis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Figure 1: Foreign bond holdings to GDP ratio



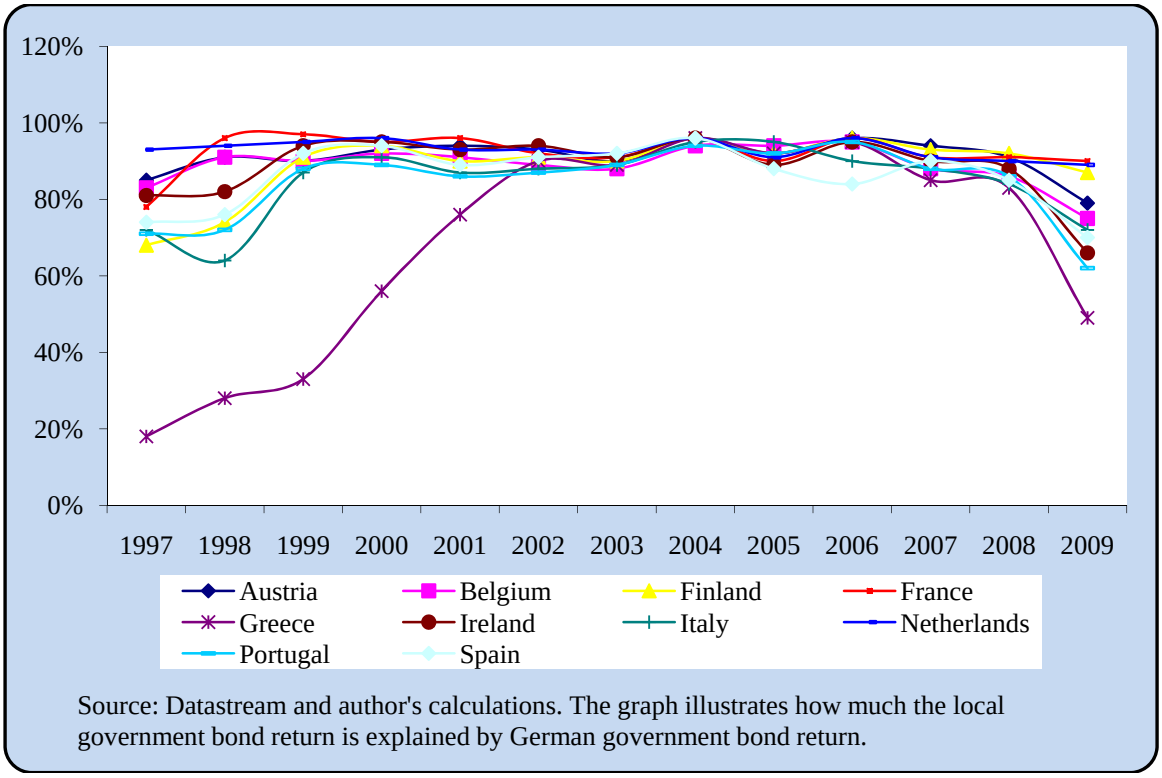
Source : IMF, CPIS database and OECD national account

Figure 2: Euro bond bias of EMU members



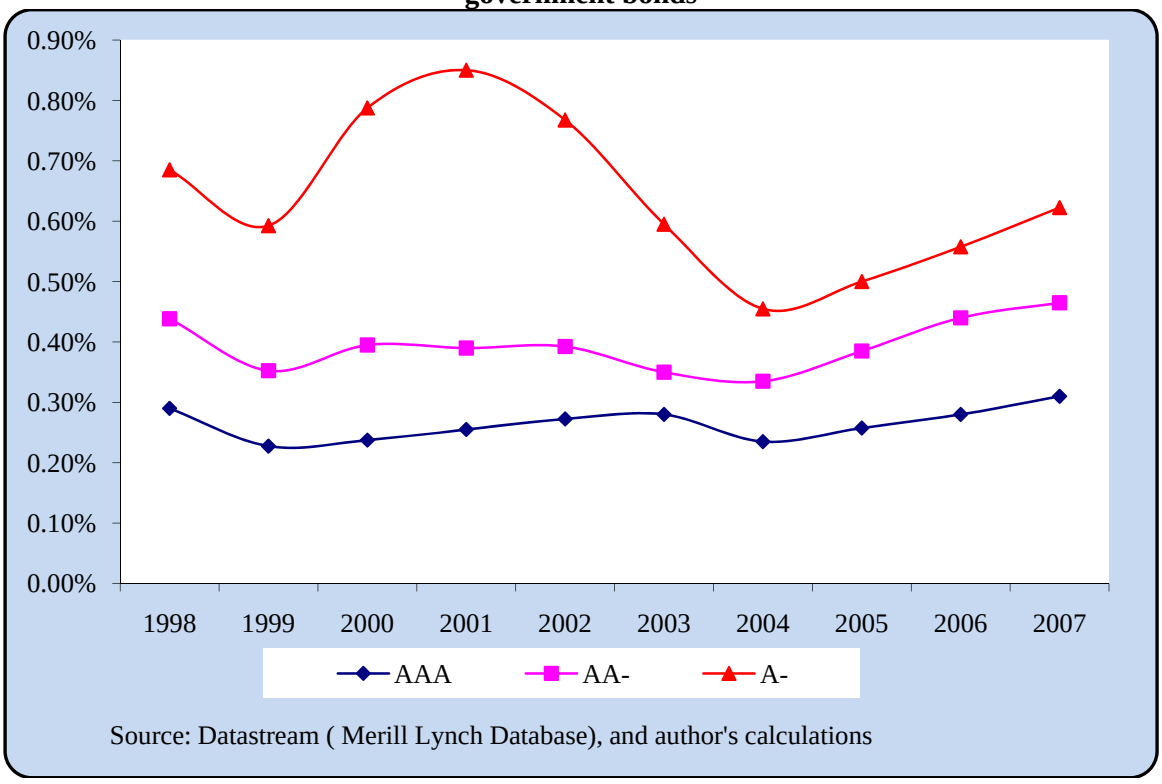
Source: IMF, CPIS database for 1997, 2001-2007. The graph illustrates the Euro share in each country's foreign bond holdings. Euro share=value of foreign bond holdings held by Euro member in Euro area is divided by the total value of foreign bond portfolio held by that country in the world.

Figure 3: Time-varying betas



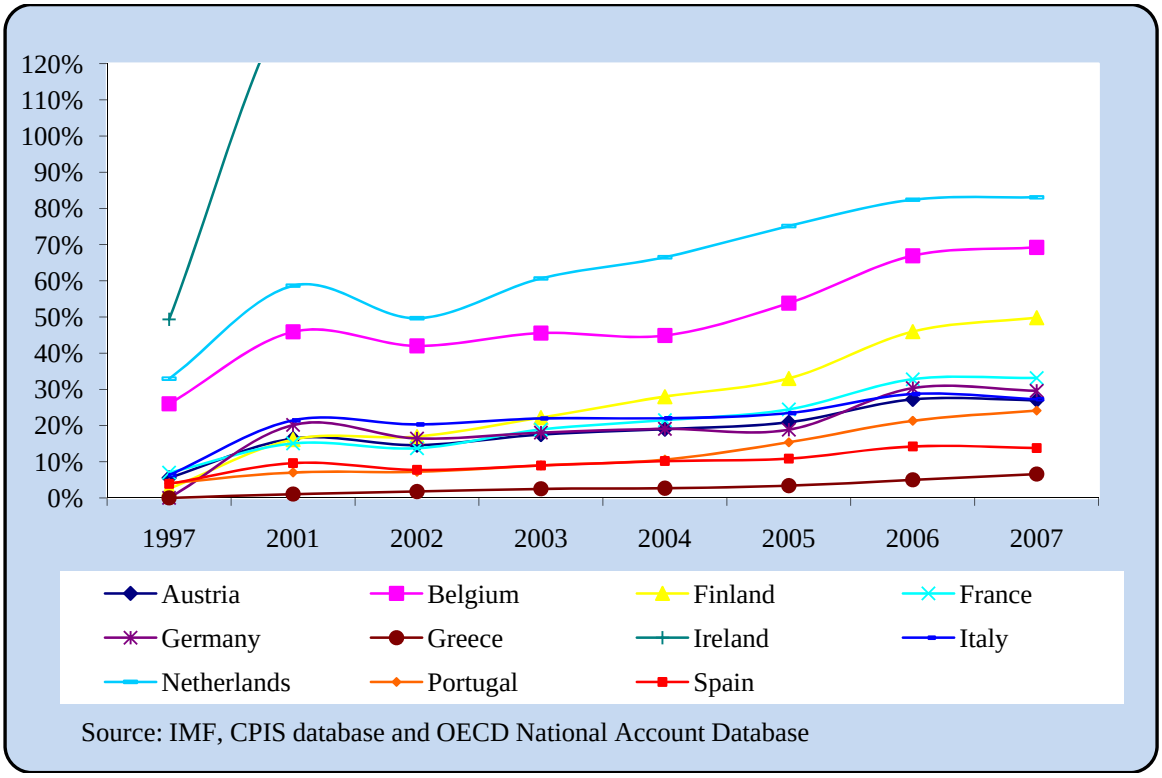
Source: Datastream and author's calculations. The graph illustrates how much the local government bond return is explained by German government bond return.

Figure 4: Euro area corporate bond indices (investment grade): Yield spreads over AAA rated government bonds



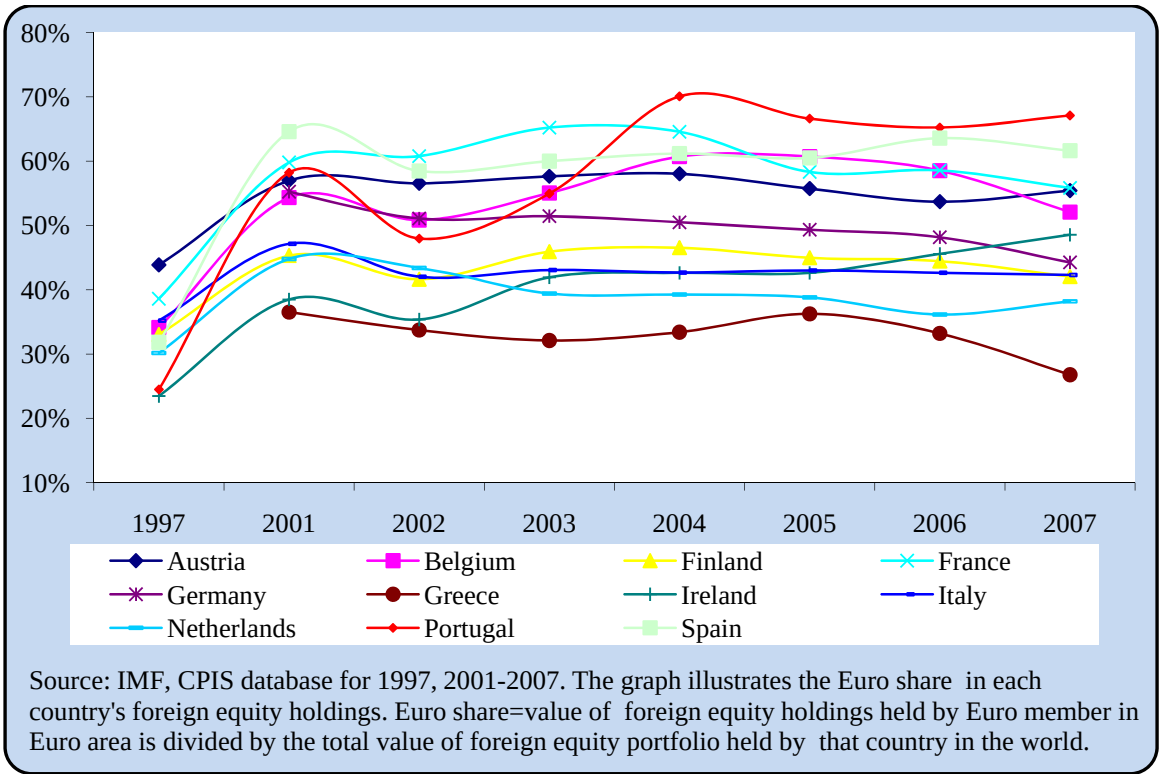
Source: Datastream (Merill Lynch Database), and author's calculations

Figure 5: Foreign equity holdings to GDP ratio



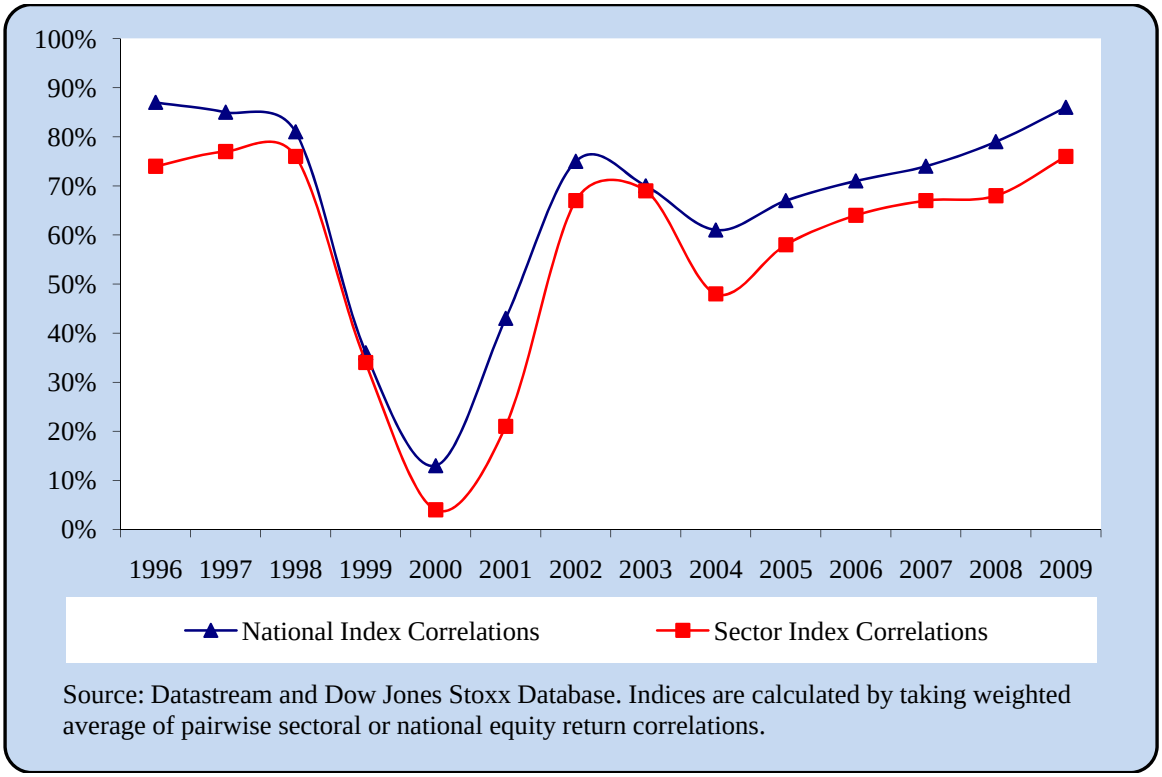
Source: IMF, CPIS database and OECD National Account Database

Figure 6: Euro equity bias of EMU members



Source: IMF, CPIS database for 1997, 2001-2007. The graph illustrates the Euro share in each country's foreign equity holdings. Euro share=value of foreign equity holdings held by Euro member in Euro area is divided by the total value of foreign equity portfolio held by that country in the world.

Figure 7: Sectoral and national equity return index correlations in euro area



Source: Datastream and Dow Jones Stoxx Database. Indices are calculated by taking weighted average of pairwise sectoral or national equity return correlations.